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CSCI 3104 **Profs. Grochow & Layer**

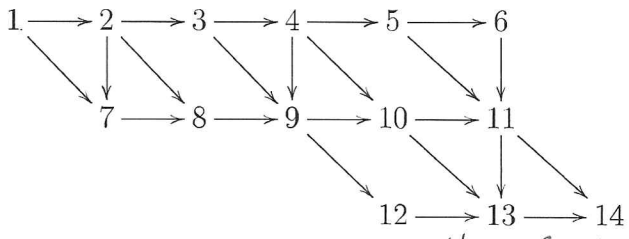
Problem Set 7 **Spring 2019, CU-Boulder**

Quick links 1 2 3a 3b 3c 4

1. (10 pts) Ginerva Weasley is playing with the network given below. Help her calculate the number of paths from node 1 to node 14.

   Hint: assume a "path" must have at least one edge in it to be well defined, and use dynamic programming to fill in a table that counts number of paths from each node j to 14, starting from 14 down to 1.

Number of paths from node 1 to node 14 is 19.



Node	Work
14 → 14	= 0
13 → 14	= 1
12 → 14	= (12→13) · (13→14) = (1)·(1) = 1
11 → 14	= 1
10 → 14	= (10→11)·(11→14) + (10→13)·(13→14 (1) · (1) + (1)(1) = 2
9 → 14	= (9→10)(10→14) + (9→12)(12→14) (1)(2) + (1)(1) = 2+1 = 3
8 → 14	= (8→9)(9→14) = 1 · 3 = 3
7 → 14	= (7→8)(8→14) = (1·3) = 3
6 → 14	= (6→11)(11→14) = 1·1 = 1
5 → 14	= (5→6)(6→14) + (5→11)(11→14) (1)(1) + (1)(1) = 2
4 → 14	= (4→5)(5→14) + (4→10)(10→14) +(4→9)(9→14) (1)(2) + (1)(2) + (1)(3) 2 + 2 + 3 = 7
3 → 14	= (3→4)(4→14) + (3→9)(9→14) (1)(7) + (1)(3) = 10
2 → 14	= (2→3)(3→14) + (2→8)(8→14) (2→7)(7→14) (1)(10) + (1)(3) + (1)(3) 10 + 3 + 3 = 16
1 → 14	= (1→2)(2→14) + (1→7)(7→14) = (1)(16) + (1)(3) = 19

# of paths from:

Node →	14
14	0
13	1
12	1
11	1
10	2
9	3
8	3
7	3
6	1
5	2
4	7
3	10
2	16
1	19